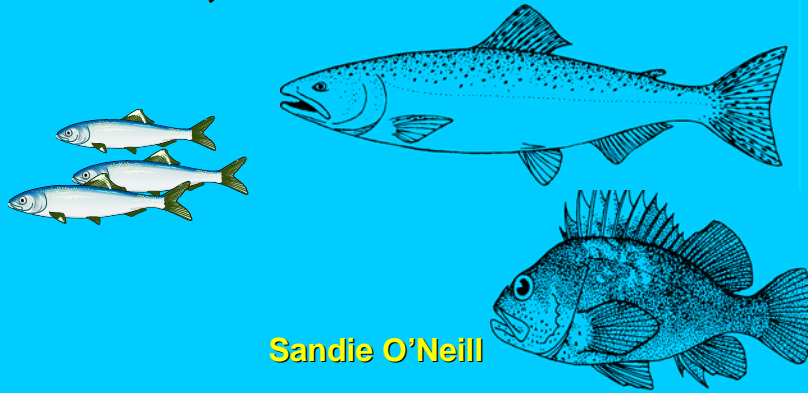


Factors Affecting Contaminants in Fishes

Habitat, Life History and Diet

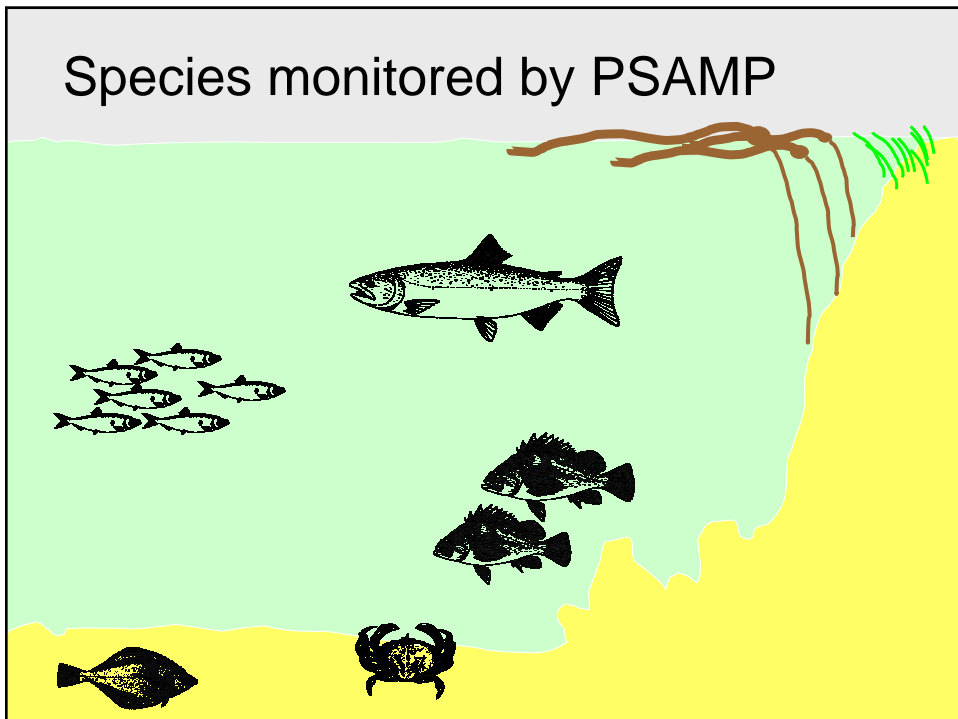
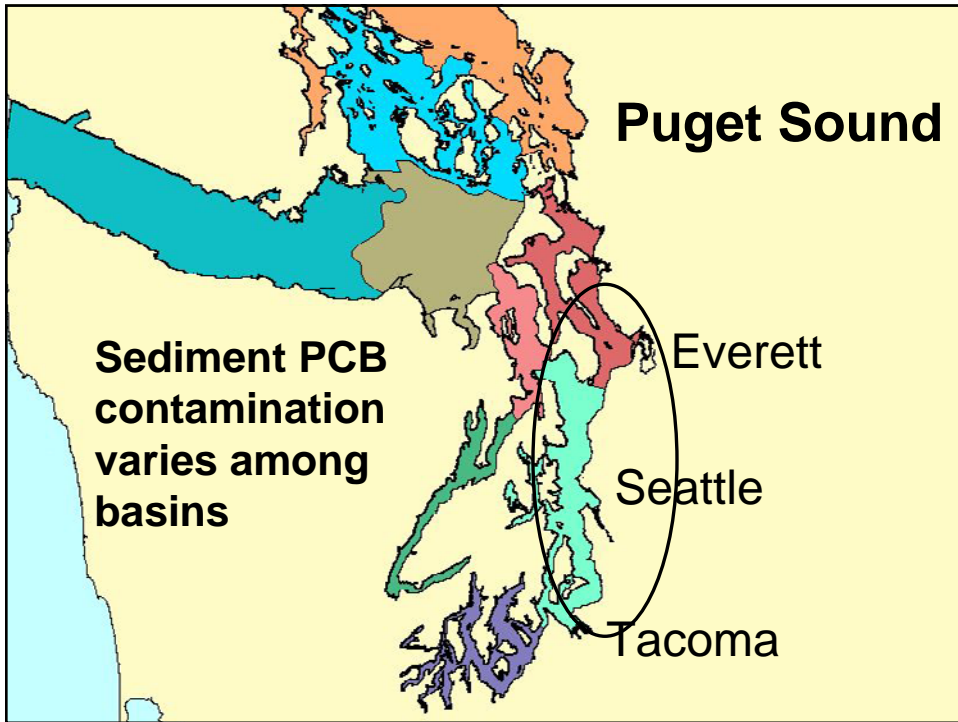


Sandie O'Neill

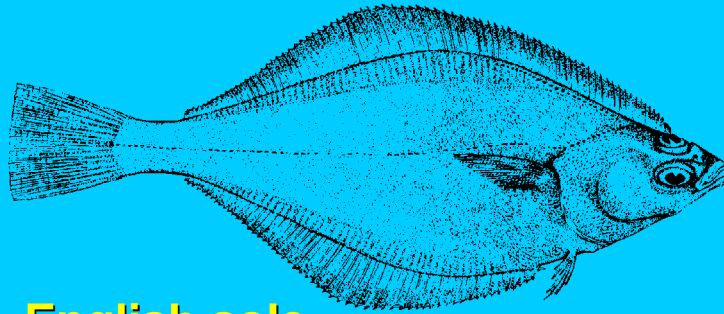
**Washington Department of Fish & Wildlife
Puget Sound Ambient Monitoring Program**

Factors Affecting Contaminant Exposure and Accumulation

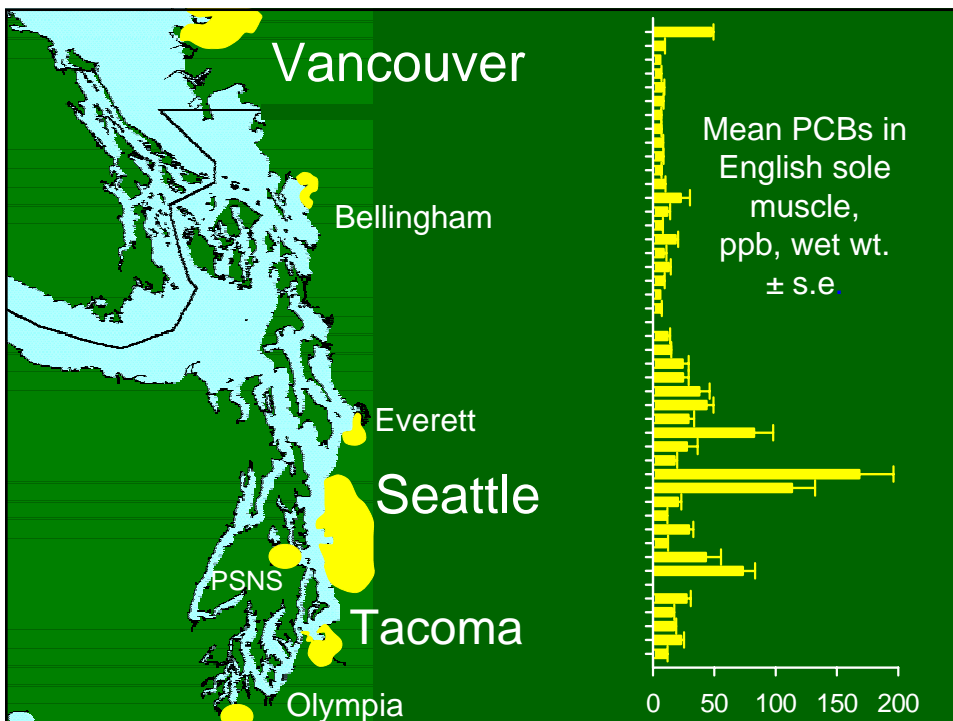
- proximity to contaminant sources
- habitat
- trophic level
- gender and age of fish
- lipid content of tissues

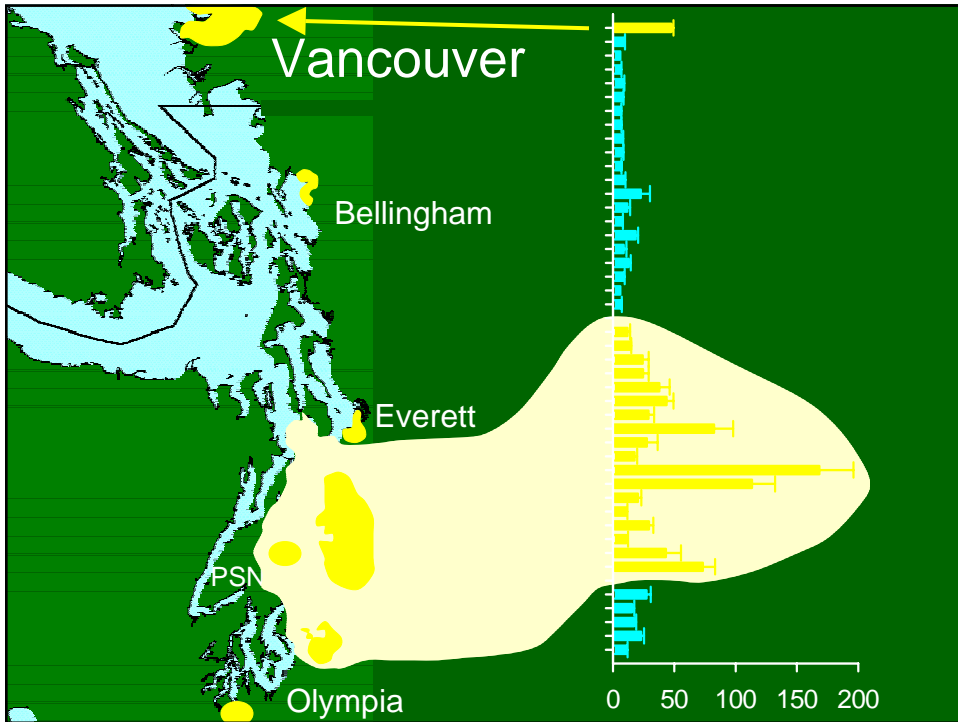


- bottom dwelling
- consumes benthic infauna
- moderate home range
- ubiquitous in Puget Sound (and west coast)

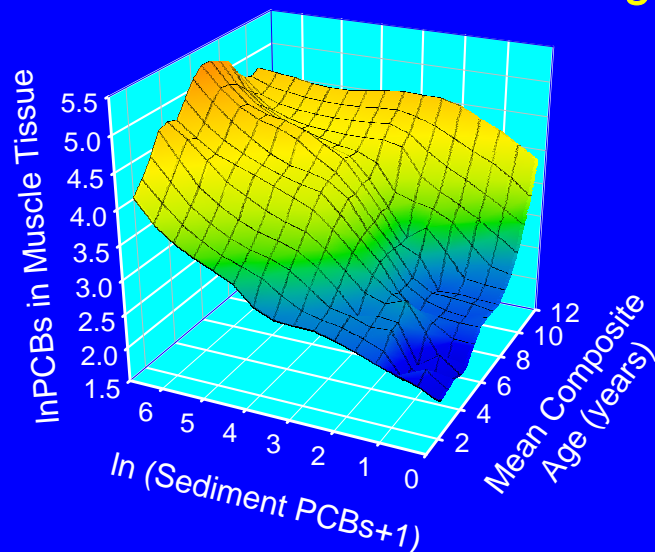


English sole
(*Pleuronectes vetulus*)



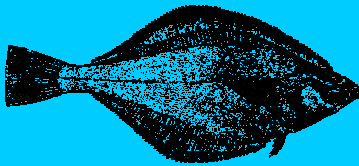


PCB accumulation in English sole vs PCB sediment levels and fish age



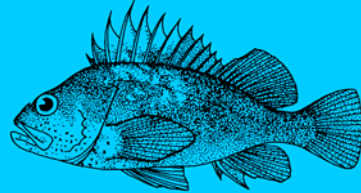
Effects of Age and Trophic Level on PCB Accumulation ?

62 $\mu\text{g/kg}$



English sole
(*Pleuronectes vetulus*)

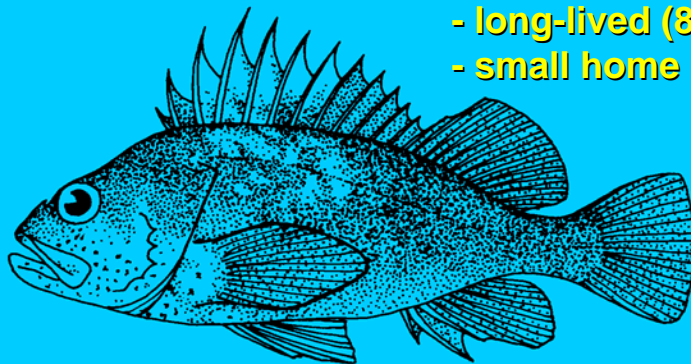
121 $\mu\text{g/kg}$



Quillback rockfish
(*Sebastes maliger*)

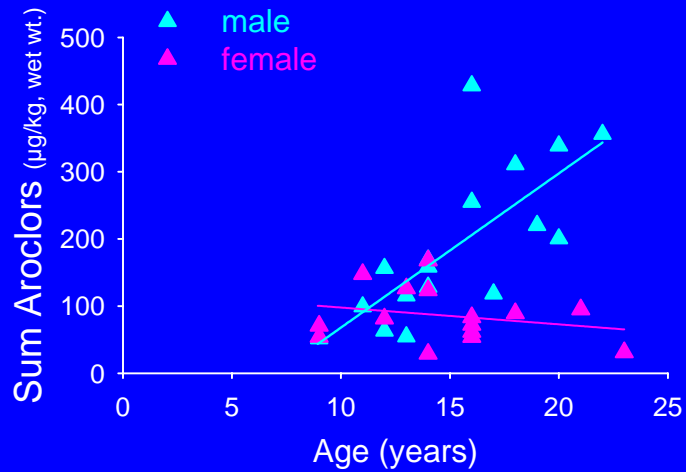
measured as Aroclor (ww) at
Seattle Waterfront

- demersal
- carnivorous
- long-lived (80+ yrs)
- small home range

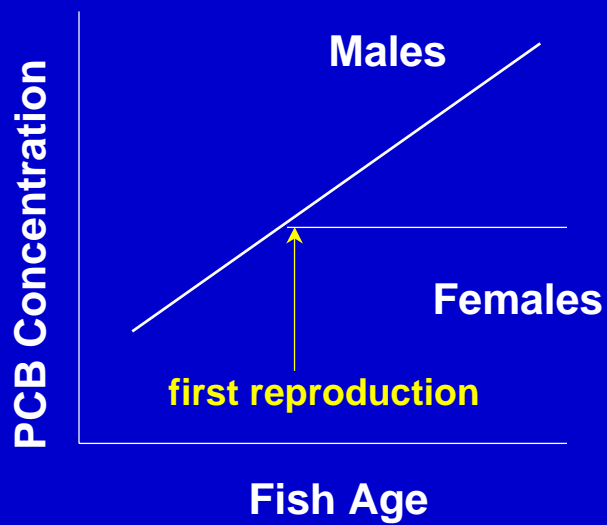


Quillback rockfish
(*Sebastes maliger*)

PCBs by Gender in Quillback Rockfish from Elliott Bay



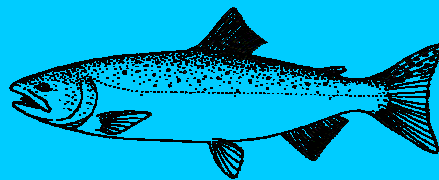
Adapted from Larson et al. 1996



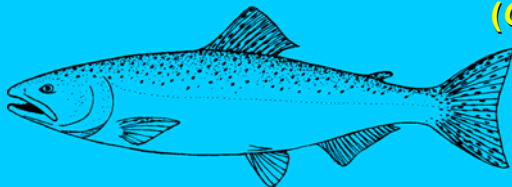
PCB Accumulation in Benthic and Demersal Fishes

- Correlated with sediment concentrations
 - highest correlation in fish with small home range
- Increase with trophic level (biomagnification)
- Bioaccumulation in long lived fish
 - possible male/female differences

- anadromous, wide-ranging, pelagic
- carnivorous
- high fat content
- complex life history

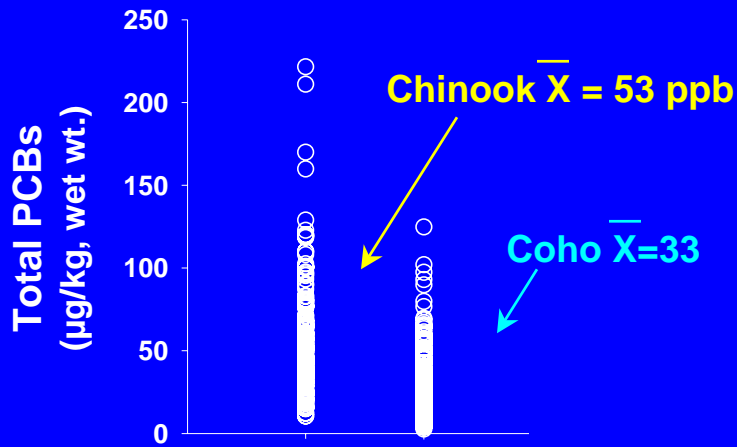


Coho salmon
(*Oncorhynchus kisutch*)



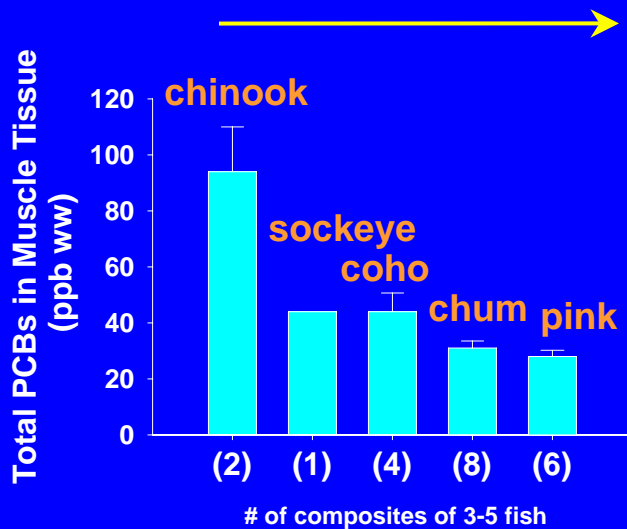
Chinook salmon
(*Oncorhynchus tshawytscha*)

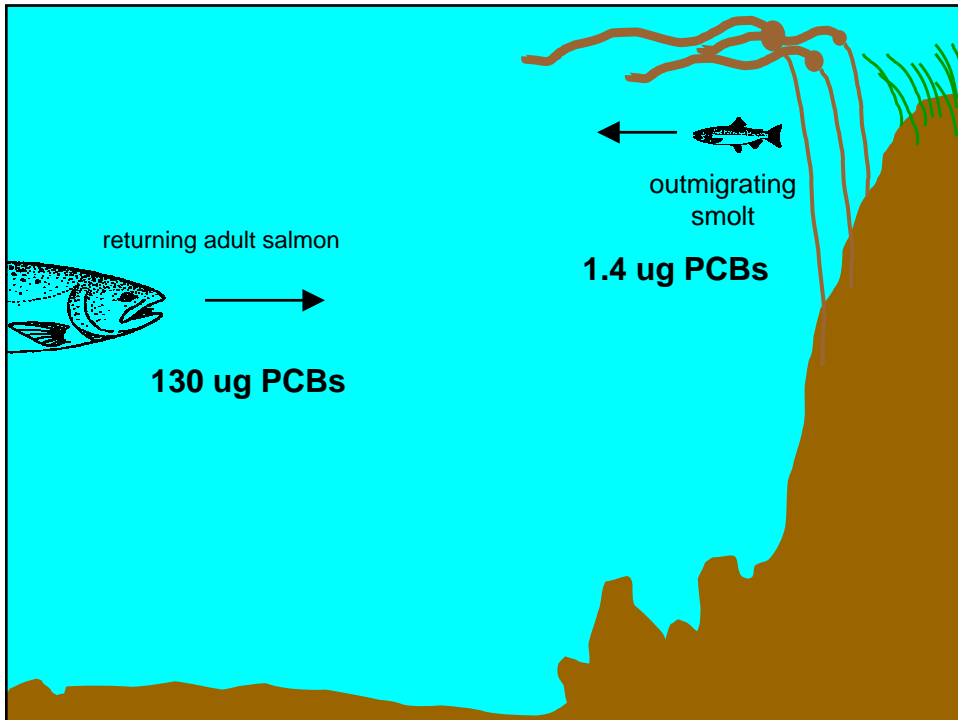
PCBs in muscle of adult salmon returning to Puget Sound

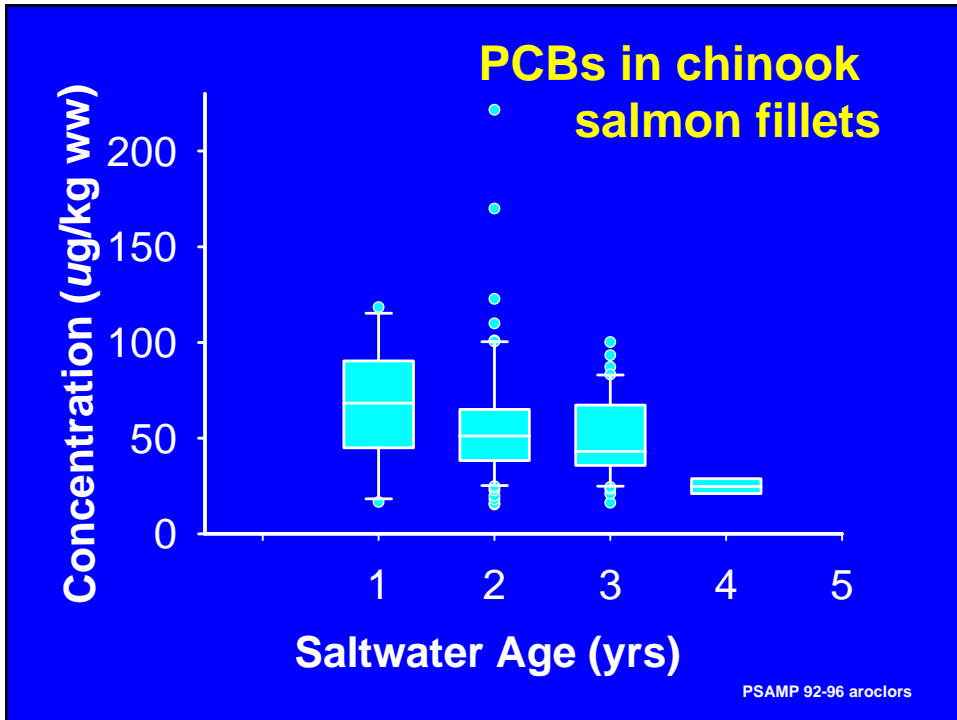


PCBs in Pacific salmon from Alaska

Decreasing Trophic Level







**Does oceanic distribution affect
PCB levels in Pacific salmon
stocks in the Pacific Northwest?**

Contaminant analysis planned to assess geographic variation in PCB levels in Pacific salmon

Location	Species				
	Chinook	Sockeye	Pink	Chum	Coho
N					
SE Alaska (mixed stocks)					★
N. BC coast (Skeena)	★	★	★		
C. BC coast (Kimsquit)				★	
Georgia Basin (Fraser)	★	★			
Puget Sound (mixed stocks)					★
Puget Sound (Skagit)			★		
Puget Sound (Nook/ Nisq)	★			★	
WA/OR coast (Columbia)	★				
CA coast (Sacramento)	★				
S					

6-8 fish per composite

PCB Accumulation in Pacific Salmon

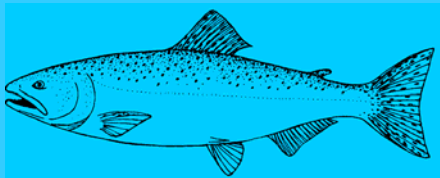
- Majority of PCBs are accumulated in marine waters including coastal areas & open ocean.
- Adult chinook /sockeye accumulate higher PCB concentrations than pink and chum.
- Species and stock-specific differences in life history traits such as saltwater age and marine distribution may influence PCB levels.

PCB Accumulation in Pelagic Fish

- Pelagic fish integrate PCBs over broad areas.
 - Need to know where fish (and their prey) feed
- Trophic level affects PCB accumulation
- Age/size may (or may not!) affect PCB accumulation
 - Depends if age/size classes feed in different areas
 - Depends if age/size classes eat at different trophic levels

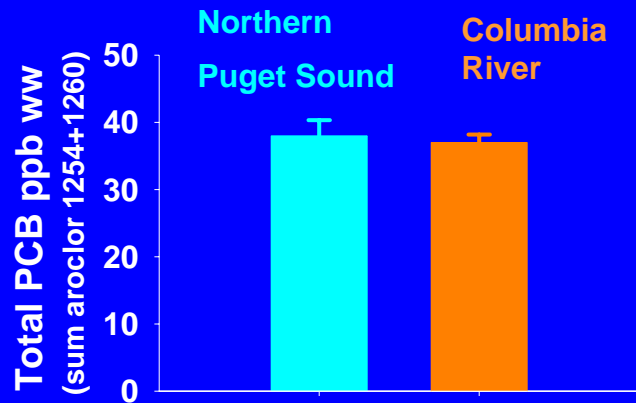
If you want to

- **design cost effective monitoring programs**
- **communicate risk information**



**Know your fish!
(or your local
fish biologist)**

Geographic Variation in PCB Levels in chinook salmon returning to spawn



Lipid Adjusted PCB for Chinook Salmon Returning to Puget Sound Rivers

